

REMARKS

Upon entry of the present amendment, claims 1-3, 6, 10, 14 and 16-22 are in the application, of which claims 1, 6, and 17 are independent.

Amendments Presented

Claim 6 has been amended to more particularly define and claim that each of the first and second shot peening treatments last for a duration in a range of 5 to 10 seconds. Applicant respectfully submits that the added claim limitation is fully supported by the original disclosure, including paragraphs [0047] and [0052] defining an exemplary embodiment of the invention. Applicant also respectfully submits that no new matter is introduced by the present amendment.

Response to Office Action

The above-identified Office Action has been reviewed, the references carefully considered, and the Examiner's comments carefully weighed. In view thereof, the present Amendment-E is submitted. It is contended that by the present amendment, all bases of rejection set forth in the Office Action have been traversed and overcome. Accordingly, reconsideration and withdrawal of the rejection is respectfully requested.

Claim Rejections – 35 USC § 103

In Item 3 of the Office Action, the Examiner has rejected claims 1-3, 6, 10, 17-19 and 21-22 under 35 USC 103(a) as being unpatentable over JP 2002-060845 (JP '845) and further in view of JP 10-204,610 (JP '610) for substantially the same reasons as set forth in the prior Office Action.

It is the Examiner's position that JP '845 discloses a method for prolonging the service life of a casting die by maintaining the compressive residual stress of a die cavity surface for more than 1000MPa and through a shot peening and nitriding process, except that JP '845 does

not disclose the surface roughness (maximum height) that is not more than 8 μ m and the use of a nitrosulphurizing process for coating the die surface. However, it is the Examiner's opinion that JP '610 discloses the use of a nitrosulphurizing process to form a coating layer on the die surface to prevent seizure in a die by forming a dense coating layer having a lubricating effect and a thermal insulating effect which improves service life by forming a nitride layer containing iron sulfide on the die cavity surface. The Examiner has taken the position that it would have been obvious to further include the iron sulfide of JP '610 with the nitride layer of JP '845.

With respect to the roughness (maximum height) of the cavity die surface, it is the Examiner's opinion that due to the alleged similarities between the shot peening treatment of JP '845 and that of applicant's invention, it is expected that the surface roughness of JP '845 will be the same as that of the instant application.

Applicant's Response

Applicant respectfully disagrees with, and traverses the Examiner's assertion that due to alleged similarities between JP '845 and the instant application, the shot peening treatment of JP '845, as disclosed, will result in the same surface roughness (maximum height) as the applicant's invention.

Paragraph [0025] in JP '845 describes that in the first shot peening, CarborundumTM (ceramic particles) with a diameter of 50-100 micrometers is projected for 60 seconds by injection pressure 0.3 MPa and in a second shot peening treatment, a steady stream of glass beads with a diameter of 1-50 micrometers is projected for 60 seconds by injection pressure 0.4MPa.

In contrast to the teaching of JP '845, the claimed invention's surface roughness (maximum height) is made not more than a predetermined value, i.e. not more than 8 μ m. In

particular, in the embodiment of the invention as claimed in amended claims 6, 10, 14, 16 and 21, by setting the shot peening time for a period in a range of 5 to 10 seconds in each of the first and second shot peening treatments, the present invention specifies a maximum time period significantly less than the time period taught by JP '845. This is significantly different from the teaching of the reference, and applicant respectfully submits that applying the shot-peening treatment for such a reduced duration is non-obvious as compared to such teaching. It is unexpected that using a time period considered insufficient by the prior art would provide a useful result.

When the first and second shot peening treatments are conducted under the conditions disclosed in JP '845, it is not possible to make a rather flat cavity surface with a small maximum height of roughness of not more than 8 μm as required in the claimed invention, since the shot peening time is relatively long in JP '845. The longer contact time suggested by JP '845 will automatically generate a surface with a height greater than that claimed by applicant.

Applicant respectfully submits that applicant has argued in the previous amendments that it is well known that the surface roughness R_y (maximum height), after a shot peening treatment, varies as the projection conditions varies, as when the treatment time is extended from 5-10 seconds (as in amended claim 6) to 60 seconds. In some case, the surface roughness R_y (maximum height) can exceed 8 μm . Please see, for example, FIG. 3 of JP 2001-9725A (a copy thereof was enclosed in applicant's previous amendment). Consequently, JP '610 does not overcome the above defect of JP ' 845.

As set forth above, the casting die, the surface treatment method and the steel die of the claimed invention are distinguishably different from what is disclosed or suggested in the cited references. Since all of the pending claims have the limitation that the surface roughness

(maximum height) is not more than 8 μm , either directly or indirectly, applicant respectfully requests reconsideration and withdrawal of all of the rejections of record, and allowance of each of the pending claims.

In regard to claims 2 and 4, the Office Action states that in the Examiner's view, JP '845 in view of JP '610 discloses the claimed limitations. Applicant respectfully disagrees with the Examiner. The JP '610 reference discloses a nitrided layer of a thickness in the range of 0.1-20 μm , while the claims 2 and 3 disclose a thickness of 0.03mm (30 μm) and 0.1mm (100 μm) respectively. Additionally, neither reference gives any suggestion, motivation or teaching to vary from the disclosed thickness range. Therefore, applicant respectfully requests reconsideration and withdrawal of the rejections of record, and allowance of pending claims 2 and 4.

In regard to claim 10, applicant respectfully traverses the Examiner's rejection. JP '845 discloses a method for treating the surface of a new casting die involving shot peening, followed by nitriding treatment, followed by a second shot peening (see paragraph [0015]), however, in relation to treatment of a used casting die, JP '845 discloses a method including only a single shot peening step followed by a nitriding step (see paragraph [0015]) once the residual stress of the casting die surface has fallen below a predetermined value, e.g., 50% of the initial value, (see paragraphs [0016] – [0021]). Moreover, claim 10 depends from claim 6, and incorporates the new limitations thereof. Therefore, for all of the above reasons, applicant respectfully requests reconsideration and withdrawal of the rejection of record, and allowance of pending claim 10.

In Item 4 of the Office Action, the Examiner rejected claims 14, 16 and 20 under 35 USC 103(a) as unpatentable over JP 2002-060845 (JP '845) in view of JP 10-204,610 (JP '610) and further in view of US 6,546,968 Nakagawa et al. (hereinafter referred to as Nakagawa) for

the same reasons as set forth in the prior Office Action.

Applicant's Response

Applicant notes that Nakagawa discloses a bond magnet and a method of manufacturing same, e.g., molding a mixture of magnetic powder and resin-based binder under controlled conditions to achieve a desired density ..., such that this reference is non-analogous art to the claimed casting die because the reference does not pertain to the field of the present invention (surface treatment of a casting die). Additionally, the Nakagawa reference does not pertain to the problem addressed by the present invention (the limited service lives of conventional casting dies), such that the Examiner's proposed further modification based on Nakagawa is improper. Moreover, claims 14 and 16 each depend from claim 6, and incorporate the new limitations thereof. Therefore, for all of the above reasons, applicant respectfully requests reconsideration and withdrawal of the rejections of record, and allowance of the pending claims 14, 16 and 20.

In Item 5 of the Office Action, the Examiner responded to the applicant's arguments in previous Amendment-D. The Examiner states that the arguments have been considered but were not persuasive. Applicant respectfully enters the following responses to the Examiner's rebuttal arguments.

A. In response to applicant's argument that JP '845 does not disclose the compound diffusion layer containing both iron sulfide and iron nitride, the Examiner notes that the rejection is now based on JP '845 in view of JP '610 (which teaches application of a sulfonitriding treatment to a die surface).

Applicant's Response

Applicant respectfully submits that either reference fails to provide the necessary motivation as required under 35 USC §103 for hypothetically modifying the casting die

of JP '845 to include the various features of the claimed invention.

The U.S. Supreme Court has recently said that “[A] patent composed of several elements is not proved obvious merely by demonstrating that each element was, independently, known in the prior art. . . . Inventions usually rely upon building blocks long since uncovered, and claimed discoveries almost necessarily will be combinations of what, in some sense, is already known. *KSR v. Teleflex*, 127 S. Ct. 1727, 1740-41, 82 USPQ2d 1385, 1396 (S.Ct.2007).

Applicant respectfully suggests that the Examiner must provide a convincing reason why he or she feels that it would be obvious to combine the elements of the cited references in the fashion claimed by applicant. “Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” (*In re Kahn*, 441 F. 3d 977, 988 (CA Fed. 2006) cited with approval in *KSR v. Teleflex*, *supra*.)

The U.S. Supreme Court has also stated that a factfinder should be aware of the distortion caused by hindsight bias and must be cautious of arguments reliant upon ex post reasoning. See *Graham*, 383 U. S., at 36 (warning against a “temptation to read into the prior art the teachings of the invention in issue” and instructing courts to “guard against slipping into the use of hindsight”. *KSR v. Teleflex*, *supra*.)

Applicant respectfully submits that the Examiner has not provided a convincing or persuasive reason why it would be appropriate to combine the references in the manner suggested by the Examiner, and respectfully points out that even if the references are hypothetically combined, for the sake of argument, the combination fails to produce applicant’s

invention as claimed.

B. In response to applicant's argument that the proposed modification of JP '845 to incorporate the sulfonitriding surface treatment of JP '610 is improper because a forging die requires thermal insulating properties, whereas a casting die does not, the Examiner asserts that it is common knowledge that the iron nitride layer of JP '845 also has thermal insulating properties, whereby JP '610 allegedly does not teach away from the proposed modification.

Applicant's Response

Applicant respectfully disagrees with the Examiner's broad generalizations which are not supported by the evidence of record in support of his proposed modification of JP '845 to selectively include the sulfonitriding treatment/layer of JP '610. For example, the Examiner does not cite any evidence to support the allegation that the nitriding layer of JP '845 would be understood, by persons of ordinary skill in the art, to have thermal insulating properties. Additionally, the Examiner fails to provide any evidence that any such thermal insulating properties would be similar to those of the sulfonitriding layer of the forging die of JP '610.

C. In response to applicant's argument that the proposed modification of JP '845 to incorporate the sulfonitriding surface treatment of JP '610 is improper because JP '845 does not disclose lubrication and does not have a seizure problem, the Examiner asserts that it is common practice in the die casting art to lubricate the die casting surface to so as to prevent a seizure problem (for example, US Patent 4,762,163), whereby it would have been obvious to apply the sulphonitriding treatment of JP '610 in the casting die of JP '845 to prevent seizure without the additional lubricating. step.

Applicant's Response

Applicant concedes that US Patent 4,762,163 discloses the use of a sprayed lubricating

agent in a casting die (for casting aluminum parts), however, this reference does not ever indicate that the lubricating spray is to prevent a “seizure problem” as the Examiner states. Additionally, the disclosed lubricating spray is very much different than the sulphonitriding treatment of JP ‘610 (e.g., the lubricating spray includes an oil component which vaporizes and a lubricating agent which is carbonized prior to injection of the molten aluminum into the die), such that the references do not provide motivation for the Examiner’s proposed modification, but at most provide motivation for use of a sprayed lubricating agent in JP ‘845.

Furthermore, applicant once again notes that the Examiner’s showing of motivation for the proposed combination of reference teachings under 35 USC §103 is the Examiner’s assertion that “... *it is common knowledge that forged die and casting die have seizure problems if not properly addressed.*” Applicant respectfully traverses the Examiner’s assertion because it is *not supported by any evidence of record and is not a proper (factual) basis for rejection under 35 USC 103.*

The Examiner appears to be taking judicial / official notice that the alleged fact are common knowledge and commonly accepted as true by persons skilled in the art. Contrary to the Examiner’s assertion, applicant respectfully submits that persons skilled in the art understand that casting and forging dies do not, in fact, have similar seizure problems. As previously explained by applicant JP ‘610 discloses a forging die, it is a well recognized problem of forging dies that forged parts are subject to seizure in the die, whereby it is also well recognized that forging dies require thermal insulation properties therein to properly function. Quite differently, JP ‘845 relates to a casting die which receives a molten metal that is cooled and solidified to form a cast part, and JP ‘845 does not disclose lubrication at all. Thus, even if JP ‘610 would disclose effects of sulphonitriding treatment on thermal insulation properties, an application of

sulphonitriding to a casting die which does not require thermal insulation properties (as in JP '845) is never suggested by the references and would not be a matter of common knowledge.

In this regard, the courts have long held that a conclusion that claimed subject matter is *prima facie* obvious must be supported by evidence, as shown by some objective teaching in the prior art or by knowledge generally available to one of ordinary skill in the art that would have led that individual to combine the relevant teachings of the references to arrive at the claimed invention. *See In re Fine*, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988).

Rejections based on § 103 must rest on a factual basis, with these facts being interpreted without hindsight reconstruction of the invention from the prior art. The examiner may not, because of doubt that the invention is patentable, resort to speculation, unfounded assumption or hindsight reconstruction to supply deficiencies in the factual basis for the rejection. *See In re Warner*, 379 F.2d 1011, 1017, 154 USPQ 173, 177 (CCPA 1967), **cert. denied**, 389 U.S. 1057 (1968).

Applicant respectfully submits, once again, that the Examiner's assertion above is a type of unfounded assumption or hindsight reconstruction which the courts have warned against.

D. In response to applicant's argument that the prior art does not teach or suggest a maximum height of roughness of cavity not more than 8µm, the Examiner alleges that since JP '845 teaches shot peening of the cavity before and after the nitriding treatment, as well as characteristics of the shot peening process which are (allegedly) similar to those of the applicant's shot peening process, "it is expected that the surface roughness of JP '845 will be the same as that of the instant application."

Applicant's Response

Applicant respectfully submits that the Examiner has not effectively rebutted the important arguments presented under item B at pages 11-14 of the previous Amendment-D

regarding the fact that none of the applied references teach or suggest a casting die having a surface roughness of $\leq 8\mu\text{m}$ as claimed, nor is such feature obvious in view of any teachings of the evidence of record or in view of common knowledge (e.g., a surface roughness which is significantly larger than $8\mu\text{m}$ has a conventionally recognized benefit in relation to a casting die such as disclosed in JP '845), whereas such claimed feature (in combination with the other features of the independent claims, including a sulfonitriding surface treatment) achieves a greatly prolonged service life over conventional casting dies.

Applicant respectfully disagrees with the Examiner's assertion that the alleged similar shot peening treatments of JP '845 and the claimed invention will result in same surface roughness (maximum height) of not more than $8\mu\text{m}$, for the same reasons state above in response to the Examiner's rejection of claims 1-3, 6-10, 17-19 and 21-22 (especially in light of the new amendment to claim 6). Further, newly amended claim 6 states that the shot peening treatment last for 5-10 seconds, while the shot peening treatment disclosed in JP '845 extends for a period of 60 seconds. As such, the allegedly similar shot peening treatments are no longer similar since there is a large difference in shot peening duration of at least 50 seconds (i.e. which is 5 times larger than the longest claimed shot peening duration). As such, the claimed invention is distinguishable, and the assumption that the shot peening treatment of JP '845 will result in the surface roughness (maximum height) of not more than $8\mu\text{m}$ is improper. Therefore, applicant respectfully requests reconsideration and withdrawal of all of the rejections of record, and allowance of each of the pending claims.

Based of the foregoing, applicant respectfully submits that, the claimed invention includes features which are neither disclosed nor suggested in any of the applied references JP'845, JP'610 and Nakagawa, considered either singly or in combination. Further, the claimed

invention including these features obtains an excellent effect which cannot be expected from JP'845 and/or JP'610, i.e., significantly prolonged service life of the casting die. Therefore, the present invention is not obvious over the disclosures of JP'610, JP'845 and Nakagawa, considered either singly or in combination.

For all of the foregoing reasons, applicant requests reconsideration and withdrawal of the rejection of claims 1-3, 6, 10, 14 and 16-20 under 35 USC §103(a).

Other Matters

Applicant, once again, respectfully requests that the Examiner approve the drawings filed in the application, while noting that no box on the Office Action Summary (item 10) has been checked in any of the Office Actions to date.

Conclusion

Based on all of the foregoing, applicant respectfully submits that all of the rejections set forth in the Office Action are overcome, and that all of the pending claims are believed to be allowable over all of the references of record, whether considered singly or in any reasonable combination. It is applicant's contention that no possible reading of the references, either singly or in any reasonable combination, can be viewed as teaching applicant's claimed invention. For all of the above mentioned reasons, applicant requests reconsideration and withdrawal of the rejection of record, and allowance of each of the pending claims.

The application is now believed to be in condition for allowance, and a notice to this effect is earnestly solicited. If any issues remain unresolved, or if the Examiner feels that the prosecution of the present application could be expedited by a telephone discussion, applicant encourages the Examiner to telephonically contact applicant's undersigned representative to resolve any such issues remaining in the prosecution of the application.

Favorable consideration is respectfully requested.

Respectfully submitted,



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